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# Health-related quality of life change in patients treated at a multidisciplinary pain clinic

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Disclosures

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## Conflicts of interest

H. Sintonen is the developer of the 15D and reports royalties from electronic versions of the 15D, outside the submitted work; the other authors report no other conflicts of interest.

## Registration & ethics

The Ethics Committee of the Helsinki University Hospital approved the study (decision no.

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## ABSTRACT

### Background

Multidisciplinary pain management (MPM) is a generally-accepted method for treating chronic pain, but heterogeneous outcome measures provide only limited conclusions concerning its effectiveness. Therefore, further studies on the effectiveness of MPM are needed to identify subgroups of patients who benefit, or do not benefit, from these interventions. Our aim was to analyze health-related quality of life (HRQoL) changes after MPM and to identify factors associated with treatment outcomes.

### Methods

We carried out a real-world observational follow-up study of chronic pain patients referred to a tertiary multidisciplinary outpatient pain clinic to describe, using the validated HRQoL instrument 15D, the HRQoL change after MPM, and to identify factors associated with this change. 1043 patients responded to the 15D HRQoL questionnaire at baseline and 12 months after the start of treatment. Background data were collected from the pre-admission questionnaire of the pain clinic.

### Results

53% of the patients reported a clinically important improvement and, of these, 81% had a major improvement. 35% reported a clinically important deterioration, and 12% had no change in HRQoL. Binary logistic regression analysis revealed that major improvement was positively associated with shorter duration of pain (<3 years), worse baseline HRQoL, higher education levels, and being employed.

### Conclusions

The majority of the patients reported significant HRQoL improvement after multidisciplinary pain management. Better understanding of the factors associated with treatment outcomes is needed to meet the needs of those who had unfavourable outcomes.

## Significance

Multidisciplinary pain management was associated with improvement in health-related quality of life in a majority of chronic pain patients. More research into factors associated with quality of life reports are needed to understand why not all patients benefit from MPM and how MPM approaches could be improved to meet the needs of these patients.

## INTRODUCTION

Chronic pain causes considerable suffering and is a major challenge for the health care system. The prevalence of severe chronic pain that lasts for at least six months ranges from 10% to 20% (Breivik et al., 2006; Elliott et al., 1999; Gureje et al., 1998; Mäntyselkä et al., 2003; Raftery et al., 2011; Verhaak et al., 1998). Chronic pain associates with self-rated poor health (Mäntyselkä et al., 2003), impaired functioning (Björnsdóttir et al., 2013), and decreased health-related quality of life (HRQoL)

(Eriksen et al., 2003; Jensen et al., 2006; Keeley et al., 2008; Nicholl et al., 2009; Vartiainen et al., 2016). Chronic pain is an important cause for disability pension (Saastamoinen et al., 2012) and the cause of considerable economic burden, both for patients and for society (Gustavsson et al., 2012).

Multidisciplinary pain management (MPM) is considered the most effective approach to managing chronic pain (Guzmán et al., 2001; Kamper et al., 2015; Scascighini et al., 2008). Based on the biopsychosocial model of pain, MPM aims to rehabilitate patients by addressing pain-related physical, psychological, social, and occupational factors. Multidisciplinary treatment consists of medical, physical, psychological and social/occupational components, delivered by professionals representing different disciplines (Kamper et al., 2015). There is increasing evidence that MPM is more effective than traditional approaches (Becker et al., 2000; Kamper et al., 2015; Lang et al., 2003; Scascighini et al., 2008; Tavafian et al., 2014). The beneficial effects of MPM include reduced pain intensity, improved functioning, and improved HRQoL (Becker et al., 2000; Dysvik et al., 2010; Heiskanen et al., 2012; Jensen et al., 2007; Kamper et al., 2015). In pediatric patients, MPM has also been shown to reduce hospital visits and related costs (Mahrer et al., 2018). However, many original studies and reviews have shown efficacy in selected patient groups only, and the quality of evidence is moderate at best (Kamper et al., 2015; Scascighini et al., 2008). Systematic reviews have identified extensive heterogeneity in studies and their outcomes and have underlined the need for well-designed studies and standardized outcomes in future studies of MPM (Deckert et al., 2016; Scascighini et al., 2008).

Measures of HRQoL aim to describe the patient's comprehensive health with a single index number that reflects the 'goodness' of the health state in relation to the range from full health to death. Such measures are important in assessing treatment outcomes - they are comparable across all patient populations and take into account all the positive and adverse effects of treatment. Measures of HRQoL are also the basis for comparative and cost-utility studies, as they facilitate the calculation of Quality-Adjusted Life Years (QALYs).

HRQoL is recommended as an outcome measure in pain management trials (Turk et al., 2003). Also, the recently-published VAPAIN consensus statement lists HRQoL as one of the key domains to be measured in trials assessing MPM (Kaiser et al., 2018). Recently, two HRQoL measures, the EQ-5D-3L and the 15D were validated in patients with chronic pain (Vartiainen et al., 2017). Both instruments were valid, but the 15D appeared somewhat more sensitive than the EQ-5D-3L in measuring pain-related symptoms (Vartiainen et al., 2017). Previously, we reported (using the 15D instrument) very low baseline HRQoL in a cohort of 1528 chronic non-cancer pain patients treated at the multidisciplinary Pain Clinic of the Helsinki University Hospital, indicating a large burden of disease (Vartiainen et al., 2016).

It has become increasingly important to provide evidence for the effectiveness of health care interventions. Not just in randomized studies but also in real-world settings in order to optimize the use of health care resources. The aim of the present study was to describe the HRQoL changes after an outpatient MPM by using a HRQoL measure validated for chronic pain, and to identify factors that associate with good or poor HRQoL outcome.

## METHODS

### Subjects

Patients with chronic non-cancer pain referred to the Pain Clinic of the Helsinki University Hospital for multidisciplinary pain management between 2004 and 2012 were invited to participate in the study. Active cancer was the only exclusion criterion. Before the first visit to the Pain Clinic, patients

received a letter informing them about the study and those willing to participate provided written informed consent. The Ethics Committee of the Helsinki University Hospital approved the study (decision no. 182/13/03/02/2009). The study was registered at the Helsinki and Uusimaa Hospital District Clinical Trials Registry, number HUS2071.

### Multidisciplinary pain management

The Pain Clinic of the Helsinki University Hospital is a multidisciplinary tertiary outpatient clinic. Admission to the Pain Clinic is based on referrals, mainly from primary health care. The staff of the Pain Clinic consists of physicians, psychologists, a physiotherapist, a social worker, and nurses. The medical specialties include anesthesiology, neurology, rehabilitation medicine, psychiatry, general medicine, and dentistry. Pain management is individualized for each patient as indicated and consists of the following components: diagnostic evaluation, patient education, pharmacotherapy, physiotherapeutic counseling (including exercise programs and transcutaneous electronic nerve stimulation), psychological counseling (including pain management strategies such as relaxation and cognitive-behavioral methods), supportive psychological therapy, group-based pain management programs, socioeconomic counseling, regional analgesia, and spinal cord stimulation. The goal of the treatment is to improve pain management and the patients' physical and psychosocial functioning.

Treatment-related variables were extracted from the hospital's electronic database. Each patient visit to the Pain Clinic is recorded in the database as a separate entry. The entry contains the date, primary ICD-10 diagnosis for the visit and data on the different professionals the patient has seen. For each patient, we extracted the total number of visits and the number of visits to each discipline: physician, physiotherapist, psychologist, social worker, group-based therapy or social worker. We included only the visits that had occurred during the HRQoL follow-up (i.e., between the dates of the first and last HRQoL questionnaire).

In addition to the recorded visits, each patient meets a nurse several times during the treatment episode, often before or after seeing a physician. However, the visits to the nurse are not recorded. Some of the treatment contacts with physicians and nurses are also made by phone, but the phone contacts were not included in the data.

The type of chronic pain was extracted from the hospital's electronic archives. The record of the visit to the Pain Clinic also contains the diagnoses based on the ICD-10 coding (WHO, 2011). Based on the diagnosis, the pain was classified as 'Musculoskeletal', 'Neuropathic', 'Widespread', 'Pelvic', 'Visceral', 'Headache disorders', and 'CRPS' (complex regional pain syndrome). In case of missing or non-pain-related diagnoses, the diagnosis was manually checked from the patient records.

### Study design

At the start of the multidisciplinary pain management (MPM), patients filled in the 15D questionnaire and the clinical questionnaire of the Pain Clinic. For the follow-up, the patients were contacted by mail and asked to fill in another 15D questionnaire at six months and 12 months after the start of the treatment. We chose the 15D score change at 12 months after the start of treatment as the main outcome measure in order to assess the long-term changes of HRQoL after MPM, and also because for several patients the treatment period might last for more than 6 months.

### Measures

#### 15D, Health-Related Quality of Life Instrument

The 15D is a generic, self-administered, standardized HRQoL instrument (Sintonen, 1994, 1995, 2001), ([www.15d-instrument.net](http://www.15d-instrument.net)). It consists of 15 dimensions of health (mobility, vision, hearing, breathing, sleeping, eating, speech, excretion, usual activities, mental function, discomfort and symptoms, depression, distress, vitality, and sexual activity), each having five levels of severity from

which the patient chooses the one best describing his/her health state at that moment. It takes about 5 minutes to fill in the questionnaire. The 15D can be used both as a profile and as a single index score measure.

The single index number (15D score) represents the overall HRQoL on a scale of 0 to 1, where 0 = death and 1 = full health. The individual dimension level values reflect the seriousness of problems in the said dimension on a 0-1 scale (0 = death; 1 = no problems). Mean dimension level values are used to draw the 15D profiles.

The scores reflect the population's preferences of a certain health state over death and full health. The scores are calculated from the health state descriptive system (questionnaire) by using a set of population-based preference or utility weights. These weights have been elicited from representative population samples by using magnitude estimation in a 3-stage valuation process based on the multi-attribute utility theory (Sintonen, 2001).

Clinically important changes of the 15D score are established using an anchor-based method: a change  $> 0.015$  (positive or negative) is considered to indicate a clinically important improvement or deterioration, and a change  $> 0.035$  to indicate a major improvement or deterioration. In studies using the 15D change as an outcome indicator, it is recommended that the mean 15D score change and the distribution of the score changes in these categories of clinical importance be reported (Alanne et al., 2015). The 15D has been validated in patients with chronic pain (Vartiainen et al., 2017).

#### Clinical pain questionnaire

Patients also filled in the standard questionnaire of the Pain Clinic. This is used to record important background factors, the nature of the pain, the functioning, and the expectations of the pain patients, both in research and clinical practice (Knaster et al., 2012). In our study, the patients filled in the clinical questionnaire at the start of the MPM program, at the same time point as the 15D questionnaire. From the clinical questionnaire, the following questions were analyzed in the study: education level and current employment status; marital status (living alone or cohabiting); Visual Analog Scales (VAS 0-100 mm, 0 representing no pain and 100 the worst possible pain) for the intensity of pain at the moment and for pain-related distress; pain interference with daily activities; the number of major pain types; the duration of pain; and whether the pain was constant or intermittent. The number of pain types was dichotomized to one or multiple, and the duration of pain to more or less than 3 years. The cut point was set at 3 years, based on a previous report by Dunn et al. suggesting that duration of low back pain for over 3 years was an independent predictor of prognosis of pain management (Dunn and Croft, 2006).

Pain interference with daily activities was measured using the sum score of the question 'How much does your pain affect the following activities?', followed by 18 activities with the response options 'not at all,' 'moderately,' and 'much'. The respective choices were scored as 0, 1, or 2 points. To set the sum score to the same scale as the two VAS scores, it was presented as a percentage of the maximum score. To eliminate the confounding effect of missing answers to single activities, the sum score was presented as percentage of an individual patient's theoretical maximum sum score. In other words, we used personal mean imputation to predict the missing answers to the question, if the patient had answered for at least five of the 18 activities. For example, if a patient had answered 'moderately' to 17 activities and left 1 activity blank, the patient would have a score of 17 out of 34, and the impact percentage would be 50%. Patients with fewer than five activities answered were not included.

## Statistical methods

All statistical analyses were done with R (R Core Team, 2015). Descriptive statistics for background variables, treatment variables, and HRQoL changes are reported as means and standard deviations (SD) for continuous variables, and as counts and percentages for non-continuous variables. Paired samples *t*-tests were used to test the statistical significance of mean changes in the 15D score and in the individual dimensions from baseline to the 12-month follow-up. To compare the differences in the dimensions of 15D, we used the Mann-Whitney U test because the dimension values can attain 5 levels and the distribution is non-normal.

We compared the individual 15D score changes with the cutoff values of for clinical importance (Alanne et al., 2015). For exploratory analyses, we divided the patients into three groups according to the 15D HRQoL score change ("Same or worse", "Minor improvement", "Major improvement"), based on the 15D score changes after 12 months ( $< 0.015$ ,  $0.015$  to  $0.035$ , and  $> 0.035$ , respectively). We analyzed the preliminary association of the background variables with treatment response by comparing the means of the continuous variables between the three groups of treatment response with one-way ANOVA or, in the case of categorical variables, by chi-squared test. One-way ANOVA was also used to assess the preliminary differences of the 15D score change between the different types of chronic pain. We further analyzed the association of continuous variables with the 15D score change by Spearman's correlation test.

We made a binary logistic regression model for predicting whether a patient would achieve a clinically major improvement in HRQoL. The two groups were based on whether the 15D score change was less than, or greater than or equal to,  $+0.035$ , the threshold for major improvement (Alanne et al., 2015). Background variables were selected for the model based on preliminary significance, that is, if  $p < 0.05$  for differences in preliminary ANOVA/chi-squared tests, and if the inclusion was logically justified.

Patients with missing data were excluded from the regression analyses. The baseline 15D score, pain intensity VAS, age and education of the patients who had not responded to the follow-up were compared with the patients who responded, to analyze any differences between the two patient groups. The same comparison was made between the patients whose data had been used to construct the regression model and those left out of the model.

## RESULTS

### Study subjects

Altogether, 1573 patients completed the 15D questionnaire at baseline. Of these, 21 were duplicate cases attending a second treatment program during the follow-up, 24 provided insufficient baseline 15D data, and 20 patients were referred to psychological consultation only. These patients were excluded. Of the remaining 1508 patients, 1043 responded to the follow-up 15D questionnaire at 12 months after the start of the MPM. The response rate was thus 68%. 52% of the patients had a clinically important HRQoL improvement during the follow-up and 43% had a major improvement. **Table 1** shows the socioeconomic and pain-related background characteristics of the patients in the different groups of HRQoL change from baseline to 12 months. **Table 2** shows the study subjects' types of chronic pain, as well as the respective mean changes of the 15D scores.

### Patients not included to the analyses

467 patients did not reply to the 15D follow-up at 12 months. Compared with those who completed the follow-up, they were younger (mean 49 vs 54 years,  $p < 0.001$ ) and had slightly higher education (42% vs 35% completing post-secondary education,  $p = 0.018$ ). There were no statistically significant differences in the mean baseline 15D scores or pain intensities. Further, the time when the patients



started their treatment (between 2004 and 2012) did not correlate with the 15D score change or with the baseline 15D score.

266 patients with missing answers to the background variables were not included in the regression model. We compared the patients who had provided valid answers to the background questions with those who provided incomplete answers. These groups did not have statistically significant differences regarding age, baseline 15D scores or baseline pain intensities. However, the patients with missing answers had a smaller 15D score change at 12 months than those with complete answers (mean 0.003 vs 0.021,  $p = 0.01$ ).

#### Treatment characteristics

During the outpatient MPM program, the number of visits per patient ranged from 1 to 47. The median number of visits was 4 and the mean 5.6 (SD 2.1). The different professionals seen during MPM are compared across different improvement groups in **Table 3**. In addition to the disciplines in Table 2, each patient met a nurse at least once, but in many cases several times during the MPM episode, but the nurse consultations were not recorded in the database.

#### Health-related quality of life changes

The mean 15D score of the patients in the total sample increased by 0.017, from 0.711 to 0.728 (95% CI for mean = 0.012 to 0.023,  $p < 0.001$ ) during the 12-month follow-up. The mean change is clinically important.

**Figure 1** shows the distribution of patients into different categories of clinical importance according to the change in the 15D score (Alanne et al., 2015).

**Figure 2a** shows the mean 15D profiles, i.e., the mean scores of the individual dimensions, before treatment for those who reported major improvement compared with the other patients (a cutoff value of the 15D score change greater than or less than 0.035). In **Figure 2b**, the changes of the individual 15D dimensions at the end of the 12-month follow-up are shown for the major improvement group and other patients.

#### Variables associated with the HRQoL outcome.

**Table 1** shows the variables associated with the 15D score change, that is, age, gender, being employed at baseline, having received post-secondary education, baseline 15D score and pain duration of more than 3 years.

We also tested the correlations of the continuous background and treatment-related variables with the 15D score change. The strongest correlation was seen with the baseline 15D score ( $\rho = -0.12$ ,  $p < 0.001$ ). Other variables correlating with the 15D score change were age ( $\rho = -0.062$ ,  $p = 0.045$ ), with younger patients being more likely to improve, and the number of visits to the physician ( $\rho = -0.081$ ,  $p = 0.009$ ). There were no statistically significant correlations between the 15D score change and the following variables: VAS for pain intensity or pain-related distress, and the total number of visits to the pain clinic.

The type of pain did not appear to predict HRQoL changes. The 29 patients with pelvic pain reported the largest mean 15D score change (+0.052) and the 377 patients with musculoskeletal pain reported the smallest mean 15D score improvement (+0.011) of the different pain types, but the differences were not statistically significant.



## Regression analysis

Background variables were selected for the binary regression model based on preliminary statistical significance (shown in Table 1): these were age, gender, higher education, employment, and duration of pain of more than 3 years.

The odds ratios of the independent variables for major improvement are shown in **Figure 3**. The coefficients of the binary logistic regression model are shown in **Supplementary Table 1**.

To further confirm the results, we also ran other regression analyses. We made two linear regression models, one with the background variables showing preliminary statistical significance (age, gender, higher education, employment, and duration of pain for more than 3 years), and the other with all analyzed background variables (listed in **Table 1**). The coefficients of these regression models are shown respectively in **Supplementary Tables 2a** and **2b**. The results of the linear models were similar to those of the binary regression model, and the addition of other variables than those showing preliminary statistical significance did not change the results.

The adjusted  $R^2$  of the linear model with the preliminary significant background variables was 0.08 with  $p < 0.001$ : in other words, the model explained 8% of the observed variance in the 15D score change.

## Discussion

### Principal results

The present study examined the HRQoL changes in a large cohort of patients with chronic pain after multidisciplinary pain management at a tertiary pain clinic. The HRQoL improved in the majority of patients, but there was much variation in the HRQoL changes: 53% of the study patients achieved a clinically important improvement in HRQoL at 12 months compared with baseline, though in 35% the HRQoL deteriorated. Dimensions that improved the most were mainly those measuring psychological health. Duration of pain for less than 3 years, post-secondary education, being employed and having lower HRQoL at baseline were associated with better HRQoL outcome.

### Change in HRQoL after MPM

MPM has been shown to be effective in improving HRQoL in patients with chronic pain (Heiskanen et al., 2012; Lang et al., 2003; Moradi et al., 2012). There is also strong evidence of MPM being more effective than so-called usual or unidisciplinary care (Becker et al., 2000; Jensen et al., 2005; Kamper et al., 2015; Karjalainen et al., 1999; Scascighini et al., 2008). In our study, a clinically important and statistically significant mean improvement of HRQoL was observed after multidisciplinary treatment. This improvement was considered major in 43% of the patients, though 28% reported major deterioration of HRQoL. The baseline HRQoL of the present study population has previously been reported, and was one of the lowest reported with the 15D instrument (Vartiainen et al., 2016).

The only pain-related baseline factor that was associated with a significantly poorer HRQoL outcome was the self-reported duration of pain for more than three years. Other studies have also shown that duration of persistent pain may influence the response to pain treatment, more modest outcomes being seen with longer duration of pain (Moradi et al., 2012). Dunn et al. concluded that symptom duration for more than three years is an independent predictor of outcome of pain management (Dunn and Croft, 2006). Interestingly, functional magnetic resonance imaging (fMRI) has shown that the representation of pain perception changes when pain becomes chronic (Hashmi et al., 2013). These results mandate more studies to clarify the relation of pain, treatment outcome, and duration of symptoms.

Other baseline variables independently associated with the HRQoL outcome were employment, post-secondary education, and baseline 15D score. Socioeconomic factors have been shown to be associated with MPM outcomes, mostly in observational studies (Gerdle et al., 2016; Heiskanen et al., 2012; van der Hulst et al., 2005). Also, worse symptoms at baseline have been associated with greater improvements in the respective measures (Gerdle et al., 2016). The patients with poor HRQoL may simply have more room for improvement, or they might have had a different psychological symptom load which has generally been shown to associate with the treatment outcome (Boonstra et al., 2015).

Those patients who responded incompletely to the background questionnaire seemed to have a smaller mean 15D score change. A possible explanation might be that those who did not answer might have been less motivated to accept treatment, as patient expectations have been shown to be associated with pain management outcomes (Cormier et al., 2016).

Most patients in the present study achieved either major improvement or major deterioration in HRQoL. Interestingly, similar results have been reported regarding the efficacy of pharmacological interventions. Moore et al. reported that patients achieved either substantial pain reduction or marginal response/deterioration in both treatment and placebo groups, and few patients achieved an "average" response (Moore et al., 2010, 2014). For this reason, they recommended the reporting of individual-level responder data when assessing pain management outcomes. The fact that this response pattern was achieved in both placebo and treatment groups may reflect differences in psychological aspects of patients, such as self-efficacy, readiness to change or patient expectations, that have been associated with outcomes of pain management (Cormier et al., 2016; Keefe et al., 2004).

#### Different multidisciplinary pain management programs

MPM programs differ in composition and duration, and their definition across the literature varies (Scascighini et al., 2008). In a systematic review of RCTs assessing the effectiveness of MPM, no treatment-related variables were associated with treatment outcomes, while the heterogeneity of studies and their outcomes did not allow comparison of different studies with each other (Scascighini et al., 2008). Intensity of MPM programs does not appear to associate with outcomes for low back pain patients (Kamper et al., 2015). No conclusions about the effectiveness of different treatment modalities can be made from the present results, as the MPM was individually tailored for each patient and no control groups were available.

#### HRQoL as an outcome indicator of MPM

Multidisciplinary pain management aims to comprehensively rehabilitate patients and improve their overall functioning, even though pain intensity might not be significantly reduced. HRQoL is thus well suited for assessing its outcomes. Generic, single index HRQoL instruments, including the 15D, usually try to cover the WHO aspects of health: physical, mental/experiential and social. The instruments differ in how they operationalize these aspects (i.e., convert them into measurable variables). The strengths of HRQoL are that it is comparable across all patient groups, it takes into account the possible adverse effects of treatment, and it allows the assessment of cost-effectiveness. HRQoL is also well suited to routine outcome measurement, as most instruments are easy to fill in. On the other hand, a generic HRQoL instrument can be less sensitive to disease-specific outcomes as it might not capture all the relevant aspects of the disease. Ideally, studies of pain interventions should measure several outcomes. A consensus statement of core MPM outcome domains was recently published, HRQoL being one of them (Kaiser et al., 2018).

#### Strengths and limitations

A notable strength of the present study is the use of the 15D HRQoL instrument which has been validated and shown to be superior to the EQ-5D-3L in patients with chronic pain (Vartiainen et al.,

2017). In systematic reviews of the instruments' attributes, the 15D has fared equally well or better than other HRQoL instruments (Hawthorne et al., 2001; Richardson et al., 2016), and its wider use has been recommended (Richardson et al., 2016). The present results provide real-world evidence on what happens to HRQoL after MPM. Also, the large size of the analyzed study sample, the long follow-up time, and the lack of exclusion criteria give weight to our results.

Several limitations of the present study are acknowledged. Our study was observational and did not include a control group. The study sample represents the most challenging group of chronic pain patients, who have had several failed treatment attempts in primary care, and the results might not be generalizable to all chronic pain patients. The types of pain or their multiplicity did not appear to be related to the HRQoL change – this might be due to the lack of validated classification systems, or to the overlap of chronic pain conditions (Maixner et al., 2016). Although HRQoL is designed to encompass overall health, we only used a single outcome measure (the 15D), and our conclusions are subject to the limitations of that measure. As the patients were not randomized, no conclusions about the effectiveness of MPM or different modalities of treatment can be made. However, a control group may not always be possible. For example, in this study, the use of, for example, a waiting list control group would have been both unethical and impossible, as the Finnish law requires the patients to be accepted into the MPM program within three months of referral.

There are sources of bias that might account for the observed HRQoL changes. As some patients refused to participate, selection bias is possible – those who participated might have been more motivated than those who refused. HRQoL is sensitive to other changes in health, possibly unrelated to chronic pain. An effect known as response shift, an adaptation or change in an individual's conceptions and values of health, is known to account for some of the HRQoL changes (Postular and Adang, 2000). Another phenomenon known as regression to the mean, i.e., the tendency of extreme measurements to move towards the mean when repeated might explain why lower 15D scores were associated with greater improvement in HRQoL. However, in an RCT of a MPM program similar to that in the present study, the authors concluded that regression to the mean was an unlikely explanation for the observed benefit, as the waiting list group deteriorated and the usual care group remained unaffected (Becker et al., 2000).

## Conclusions

On average, a clinically important, long-term improvement was observed in patients with chronic pain after multidisciplinary pain management. The improvement was observed in dimensions relevant to chronic pain, mostly in those of psychosocial health. There are, however, major differences in treatment outcomes, most patients achieving either a major improvement or a major deterioration of HRQoL. Pain experienced for more than three years was associated with poorer treatment outcome, which calls for more research on the relationship of pain duration and the outcomes of treatment. As the measures used in pain research are heterogeneous, future research should compare different outcome measures in monitoring MPM outcome. More evidence is needed on the effectiveness of different treatment modalities provided in MPM clinics, and their targeting to patients. Most of all, more effort should be put into identifying patient-related factors that predict treatment outcomes in the heterogeneous and challenging group of patients with chronic pain.

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## Author contributions

EK and RR initiated the current project. PV, RR and HS designed the statistical analyses. PV and TH wrote the first draft of the manuscript. All authors discussed the results, and reviewed and revised the manuscript. P. Vartiainen and E. Kalso are the guarantors of the research paper.

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## Conflict of interest statement

H. Sintonen is the developer of the 15D and reports royalties from electronic versions of the 15D, outside the submitted work; the other authors report no other conflicts of interest that may have affected the work.

## References

- Alanne, S., Roine, R.P., Räsänen, P., Vainiola, T., Sintonen, H. (2015). Estimating the minimum important change in the 15D scores. *Qual Life Res* 24, 599–606.
- Becker, N., Højsted, J., Sjøgren, P., Eriksen, J. (1998). Sociodemographic predictors of treatment outcome in chronic non-malignant pain patients. Do patients receiving or applying for disability pension benefit from multidisciplinary pain treatment? *Pain* 77, 279–287.
- Becker, N., Sjøgren, P., Bech, P., Olsen, A.K., Eriksen, J. (2000). Treatment outcome of chronic non-malignant pain patients managed in a danish multidisciplinary pain centre compared to general practice: a randomised controlled trial. *Pain* 84, 203–211.
- Björnsdóttir, S., Jónsson, S., Valdimarsdóttir, U. (2013). Functional limitations and physical symptoms of individuals with chronic pain. *Scand J Rheumatol* 42, 59–70.
- Boonstra, A.M., Reneman, M.F., Waaksma, B.R., Schiphorst Preuper, H.R., Stewart, R.E. (2015). Predictors of multidisciplinary treatment outcome in patients with chronic musculoskeletal pain. *Disabil Rehabil* 37, 1242–1250.
- Breivik, H., Collett, B., Ventafridda, V., Cohen, R., Gallacher, D. (2006). Survey of chronic pain in Europe: Prevalence, impact on daily life, and treatment. *Eur J Pain* 10, 287–287.
- Cormier, S., Lavigne, G.L., Choinière, M., Rainville, P. (2016). Expectations predict chronic pain treatment outcomes: *PAIN* 157, 329–338.
- Deckert, S., Kaiser, U., Kopkow, C., Trautmann, F., Sabatowski, R., Schmitt, J. (2016). A systematic review of the outcomes reported in multimodal pain therapy for chronic pain. *Eur J Pain* 20, 51–63.
- Dunn, K.M., Croft, P.R. (2006). The importance of symptom duration in determining prognosis. *Pain* 121, 126–132.

Dysvik, E., Kvaløy, J.T., Stokkeland, R., Natvig, G.K. (2010). The effectiveness of a multidisciplinary pain management programme managing chronic pain on pain perceptions, health-related quality of life and stages of change—A non-randomized controlled study. *Int J Nurs Stud* 47, 826–835.

Elliott, A.M., Smith, B.H., Penny, K.I., Smith, W.C., Chambers, W.A. (1999). The epidemiology of chronic pain in the community. *Lancet* 354, 1248–1252.

Eriksen, J., Jensen, M.K., Sjøgren, P., Ekholm, O., Rasmussen, N.K. (2003). Epidemiology of chronic non-malignant pain in Denmark. *Pain* 106, 221–228.

Gerdle, B., Molander, P., Stenberg, G., Stålnacke, B.-M., Enthoven, P. (2016). Weak outcome predictors of multimodal rehabilitation at one-year follow-up in patients with chronic pain—a practice based evidence study from two SQRP centres. *BMC Musculoskelet Disord* 17, 490.

Gureje, O., Von Korff, M., Simon, G.E., Gater, R. (1998). Persistent pain and well-being: a World Health Organization Study in Primary Care. *JAMA* 280, 147–151.

Gustavsson, A., Bjorkman, J., Ljungcrantz, C., Rhodin, A., Rivano-Fischer, M., Sjolund, K.-F., Mannheimer, C. (2012). Socio-economic burden of patients with a diagnosis related to chronic pain - Register data of 840,000 Swedish patients: Socio-economic burden of patients with a diagnosis related to chronic pain. *Eur J Pain* 16, 289–299.

Guzmán, J., Esmail, R., Karjalainen, K., Malmivaara, A., Irvin, E., Bombardier, C. (2001). Multidisciplinary rehabilitation for chronic low back pain: systematic review. *BMJ* 322, 1511–1516.

Hashmi, J.A., Baliki, M.N., Huang, L., Baria, A.T., Torbey, S., Hermann, K.M., Schnitzer, T.J., Apkarian, A.V. (2013). Shape shifting pain: chronification of back pain shifts brain representation from nociceptive to emotional circuits. *Brain J Neurol* 136, 2751–2768.

Hawthorne, G., Richardson, J., Day, N.A. (2001). A comparison of the Assessment of Quality of Life (AQoL) with four other generic utility instruments. *Ann Med* 33, 358–370.

Heiskanen, T., Roine, R.P., Kalso, E. (2012). Multidisciplinary pain treatment – Which patients do benefit? *Scand J Pain* 3, 201–207.

van der Hulst, M., Vollenbroek-Hutten, M.M.R., Groothuis-Oudshoorn, K.G.M., Hermens, H.J. (2008). Multidisciplinary Rehabilitation Treatment of Patients With Chronic Low Back Pain: A Prognostic Model for Its Outcome: *Clin J Pain* 24, 421–430.

van der Hulst, M., Vollenbroek-Hutten, M.M.R., Ijzerman, M.J. (2005). A systematic review of sociodemographic, physical, and psychological predictors of multidisciplinary rehabilitation-or, back school treatment outcome in patients with chronic low back pain. *Spine* 30, 813–825.

Jensen, I.B., Bergström, G., Ljungquist, T., Bodin, L. (2005). A 3-year follow-up of a multidisciplinary rehabilitation programme for back and neck pain. *Pain* 115, 273–283.

Jensen, M.K., Thomsen, A.B., Højsted, J. (2006). 10-year follow-up of chronic non-malignant pain patients: opioid use, health related quality of life and health care utilization. *Eur J Pain* 10, 423–433.

Jensen, M.P., Turner, J.A., Romano, J.M. (2007). Changes after multidisciplinary pain treatment in patient pain beliefs and coping are associated with concurrent changes in patient functioning. *Pain* 131, 38–47.

Kaiser, U., Kopkow, C., Deckert, S., Neustadt, K., Jacobi, L., Cameron, P., De Angelis, V., Apfelbacher, C., Arnold, B., Birch, J., Bjarnegård, A., Christiansen, S., C de C Williams, A., Gossrau, G., Heinks, A., Hüppe, M., Kiers, H., Kleinert, U., Martelletti, P., McCracken, L., de Meij, N., Nagel, B., Nijs, J., Norda, H., Singh, J.A., Spengler, E., Terwee, C.B., Tugwell, P., Vlaeyen, J.W.S., Wandrey, H., Neugebauer, E., Sabatowski, R., Schmitt, J. (2018). Developing a core outcome domain set to assessing effectiveness of interdisciplinary multimodal pain therapy: the VAPAIN consensus statement on core outcome domains. *PAIN* 159, 673–683.

Kamper, S.J., Apeldoorn, A.T., Chiarotto, A., Smeets, R.J.E.M., Ostelo, R.W.J.G., Guzman, J., van Tulder, M.W. (2015). Multidisciplinary biopsychosocial rehabilitation for chronic low back pain: Cochrane systematic review and meta-analysis. *BMJ* 350, h444–h444.

Karjalainen, K.A., Malmivaara, A., van Tulder, M.W., Roine, R., Jauhiainen, M., Hurri, H., Koes, B.W. (1999). Multidisciplinary rehabilitation for fibromyalgia and musculoskeletal pain in working age adults. In *Cochrane Database of Systematic Reviews*, The Cochrane Collaboration, ed. (Chichester, UK: John Wiley & Sons, Ltd).

Keefe, F.J., Rumble, M.E., Scipio, C.D., Giordano, L.A., Perri, L.M. (2004). Psychological aspects of persistent pain: current state of the science. *J Pain Off J Am Pain Soc* 5, 195–211.

Keeley, P., Creed, F., Tomenson, B., Todd, C., Borglin, G., Dickens, C. (2008). Psychosocial predictors of health-related quality of life and health service utilisation in people with chronic low back pain. *Pain* 135, 142–150.

Knaster, P., Estlander, A.-M., Karlsson, H., Kaprio, J., Kalso, E. (2012). Temperament Traits and Chronic Pain: The Association of Harm Avoidance and Pain-Related Anxiety. *PLoS ONE* 7, e45672.

Lang, E., Liebig, K., Kastner, S., Neundörfer, B., Heuschmann, P. (2003). Multidisciplinary rehabilitation versus usual care for chronic low back pain in the community: effects on quality of life. *Spine J Off J North Am Spine Soc* 3, 270–276.

Mahrer, N.E., Gold, J.I., Luu, M., Herman, P.M. (2018). A Cost-Analysis of an Interdisciplinary Pediatric Chronic Pain Clinic. *J Pain* 19, 158–165.

Maixner, W., Fillingim, R.B., Williams, D.A., Smith, S.B., and Slade, G.D. (2016). Overlapping Chronic Pain Conditions: Implications for Diagnosis and Classification. *J Pain* 17, T93–T107.

Mäntyselkä, P.T., Turunen, J.H.O., Ahonen, R.S., Kumpusalo, E.A. (2003). Chronic pain and poor self-rated health. *JAMA* 290, 2435–2442.

Moore, R.A., Cai, N., Skljarevski, V., Tölle, T.R. (2014). Duloxetine use in chronic painful conditions--individual patient data responder analysis. *Eur J Pain Lond Engl* 18, 67–75.

Moore, R.A., Smugar, S.S., Wang, H., Peloso, P.M., Gammaitoni, A. (2010). Numbers-needed-to-treat analyses--do timing, dropouts, and outcome matter? Pooled analysis of two randomized, placebo-controlled chronic low back pain trials. *Pain* 151, 592–597.

Moradi, B., Hagmann, S., Zahlten-Hinguranage, A., Caldeira, F., Putz, C., Rosshirt, N., Schönit, E., Mesrian, A., Schiltenswolf, M., Neubauer, E. (2012). Efficacy of Multidisciplinary Treatment for Patients With Chronic Low Back Pain: A Prospective Clinical Study in 395 Patients. *J Clin Rheumatol* 18, 76–82.



Moradi, B., Zahlten-Hinguranage, A., Barié, A., Caldeira, F., Schnatzer, P., Schiltenswolf, M., Neubauer, E. (2010). The impact of pain spread on the outcome of multidisciplinary therapy in patients with chronic musculoskeletal pain - A prospective clinical study in 389 patients. *Eur J Pain* 14, 799–805.

Nicholl, B.I., Macfarlane, G.J., Davies, K.A., Morriss, R., Dickens, C., McBeth, J. (2009). Premorbid psychosocial factors are associated with poor health-related quality of life in subjects with new onset of chronic widespread pain - results from the EPIFUND study. *Pain* 141, 119–126.

Postulart, D., Adang, E.M. (2000). Response shift and adaptation in chronically ill patients. *Med Decis Mak Int J Soc Med Decis Mak* 20, 186–193.

Raftery, M.N., Sarma, K., Murphy, A.W., De la Harpe, D., Normand, C., McGuire, B.E. (2011). Chronic pain in the Republic of Ireland—Community prevalence, psychosocial profile and predictors of pain-related disability: Results from the Prevalence, Impact and Cost of Chronic Pain (PRIME) study, Part 1. *Pain* 152, 1096–1103.

R Core Team (2015). *R: A language and environment for statistical computing*. (Vienna, Austria: R Foundation for Statistical Computing).

Richardson, J., Iezzi, A., Khan, M.A., Chen, G., Maxwell, A. (2016). Measuring the Sensitivity and Construct Validity of 6 Utility Instruments in 7 Disease Areas. *Med Decis Making* 36, 147–159.

Saarni, S.I., Härkänen, T., Sintonen, H., Suvisaari, J., Koskinen, S., Aromaa, A., Lönnqvist, J. (2006). The impact of 29 chronic conditions on health-related quality of life: a general population survey in Finland using 15D and EQ-5D. *Qual Life Res* 15, 1403–1414.

Saastamoinen, P., Laaksonen, M., Kääriä, S.-M., Lallukka, T., Leino-Arjas, P., Rahkonen, O., Lahelma, E. (2012). Pain and disability retirement: A prospective cohort study. *Pain* 153, 526–531.

Scascighini, L., Toma, V., Dober-Spielmann, S., Sprott, H. (2008). Multidisciplinary treatment for chronic pain: a systematic review of interventions and outcomes. *Rheumatol Oxf Engl* 47, 670–678.

Schofield, D.J. (2014). How should we measure the impact of chronic pain? Limitations of utility measurement using the EQ-5D and SF-6D: *Pain* 155, 1918–1919.

Sintonen, H. (1994). The 15D-measure of health-related quality of life. I. Reliability, validity and sensitivity of its health state descriptive system. *Natl Cent Health Program Eval Work Pap 41 Melb*.

Sintonen, H. (1995). The 15D-measure of health-related quality of life, II. Feasibility, reliability and validity of its valuation system. *Natl Cent Health Program Eval Work Pap 42 Melb*.

Sintonen, H. (2001). The 15D instrument of health-related quality of life: properties and applications. *Ann Med* 33, 328–336.

Tavafian, S.S., Jamshidi, A.R., Mohammad, K. (2014). Treatment of low back pain: randomized clinical trial comparing a multidisciplinary group-based rehabilitation program with oral drug treatment up to 12 months. *Int J Rheum Dis* 17, 159–164.

Torrance, N., Lawson, K.D., Afolabi, E., Bennett, M.I., Serpell, M.G., Dunn, K.M., Smith, B.H. (2014). Estimating the burden of disease in chronic pain with and without neuropathic characteristics: Does the choice between the EQ-5D and SF-6D matter?: *Pain* 155, 1996–2004.



Turk, D.C., Dworkin, R.H., Allen, R.R., Bellamy, N., Brandenburg, N., Carr, D.B., Cleeland, C., Dionne, R., Farrar, J.T., Galer, B.S., Hewitt, D.J., Jadad, A.R., Katz, N.P., Kramer, L.D., Manning, D.C., McCormick, C.G., McDermott, M.P., McGrath, P., Quessy, S., Rappaport, B.A., Robinson, J.P., Royal, M.A., Simon, L., Stauffer, J.W., Stein, W., Tollett, J., Witter, J. (2003). Core outcome domains for chronic pain clinical trials: IMMPACT recommendations: *Pain* 106, 337–345.

Vartiainen, P., Heiskanen, T., Sintonen, H., Roine, R.P., Kalso, E. (2016). Health-related quality of life and burden of disease in chronic pain measured with the 15D instrument: *PAIN* 157, 2269–2276.

Vartiainen, P., Mäntyselkä, P., Heiskanen, T., Hagelberg, N., Mustola, S., Forssell, H., Kautiainen, H., Kalso, E. (2017). Validation of EQ-5D and 15D in the assessment of health-related quality of life in chronic pain. *PAIN* 158, 1577–1585.

Verhaak, P.F.M., Kerssens, J.J., Dekker, J., Sorbi, M.J., Bensing, J.M. (1998). Prevalence of chronic benign pain disorder among adults: a review of the literature. *Pain* 77, 231–239.

World Health Organization (WHO, 2011). ICD-10: International statistical classification of diseases and related health problems. *Geneva, Switzerland*.

#### Table and figure legends in the order of appearance

**Figure 1.** The distribution of the patients into the 5 categories of the 15D score change. 52.8% had a clinically important HRQoL improvement ( $> 0.015$ ) at 12 months' follow-up compared with baseline.

**Table 1.** Patient characteristics at baseline. The data are shown in three groups, based on the size and direction of HRQoL change from baseline to the 12-month follow-up. A change of  $> 0.015$  in the 15D score is considered clinically important and a change  $> 0.035$  indicates a major improvement [1].

\*The p-value represents statistical significance of the differences between the HRQoL change groups. Either one-way ANOVA or chi-squared test was used, depending on whether the baseline variable in question was categorical or continuous.

HRQoL = Health-Related Quality of Life

VAS = Visual Analog Scale

**Table 2** Chronic pain diagnoses. In one-way ANOVA, the differences between groups were not statistically significant (F value of 1.417 with  $p = 0.205$ ). CRPS = Complex Regional Pain Syndrome.

**Table 3.** Characteristics of the components of the MPM program in the three HRQoL change groups. Change was assessed from baseline to the 12-month follow-up. A change of  $> 0.015$  in the 15D score is considered clinically important, and a change  $> 0.035$  indicates major improvement [1].

\*The p-value represents the statistical significance of the differences between the HRQoL change groups. One-way ANOVA or chi-squared test was used, depending on whether the variable in question was categorical or continuous.

HRQoL = Health-Related Quality of Life

**Figure 2a.** The 15D profiles showing the mean scores of the individual dimensions at baseline. The patients who achieved a clinically major improvement in HRQoL (15D score change  $> 0.035$  at 12

months, n = 448) are compared with the other patients (15D score change < 0.035 at 12 months, n = 595 ). The difference between the two groups is statistically significant (Bonferroni-corrected  $p < 0.05$  in the Mann-Whitney U test) in "Mental function", "Depression", "Distress", and "Vitality". The patients with major improvement in HRQoL had a lower mean 15D score at baseline (0.699) than the other patients (0.720).

**Figure 2b.** Changes on the dimensions of the 15D. X-axis indicates the dimension and Y-axis the change in the mean dimension level value from baseline to the 12 months' follow-up. The patients who achieved a major improvement in HRQoL (15D score change > 0.035 at 12 months, n = 448) are compared with the other patients (15D score change < 0.035 at 12 months, n = 595). The error bars show the 95% confidence interval for the means.

**Figure 3.** The odds ratios of the background variables in the binary logistic regression model associating with a clinically major increase in HRQoL. Being employed, having received post-secondary education, pain duration > 3 years and gender are dichotomous variables, and baseline 15D score and age are continuous variables.

**Supplementary Table 1.** The results of binary logistic regression analysis with the clinically major 15D score increase as the dichotomous variable - i.e., having a 15D score change equal to or greater than, or smaller than, 0.035. Being employed, having received post-secondary education, pain duration > 3 years and gender are dichotomous variables, and baseline 15D score and age are continuous variables.

**Supplementary table 2a.** The results of multiple linear regression analysis with the 15D score change as the dependent variable. The independent (predictor) variables are those that showed preliminary statistical significance according to the results of Table 1. Being employed, having received post-secondary education, pain duration > 3 years and gender are dichotomous variables, and baseline 15D score and age are continuous variables.

**Supplementary Table 2b.** The results of multiple linear regression analysis with the 15D score change as the dependent variable and all background variables of the study as the independent (predictor) variables.

Baseline variable	HRQoL change 12 months after treatment			p*
	Same or worse ( $< 0.015$ )	Minor improvement (0.015 to 0.035)	Major improvement ( $> 0.035$ )	
Total, n	499	96	448	
Age, years, mean (SD)	55.0 (15.5)	56.4 (15.7)	52.6 (15.1)	0.018
15D score, mean (SD)	0.720 (0.113)	0.721 (0.114)	0.699 (0.110)	0.011
Post-secondary education, n (%)	128 (29.2)	27 (31.4)	168 (41.5)	0.001
Employed, n (%)	86 (18.6)	20 (21.7)	123 (29.9)	$< 0.001$
Female gender, n (%)	293 (58.7)	67 (69.8)	298 (66.5)	0.016
Pain duration $> 3$ years, n (%)	99 (25.8)	31 (34.1)	66 (17.9)	0.001
Multiple pain complaints, n (%)	343 (80.1)	67 (79.8)	313 (80.1)	0.997
Pain intensity VAS, mean (SD)	60.2 (23.6)	62.3 (24.1)	59.5 (25.0)	0.632
Pain-related distress VAS, mean (SD)	70.0 (26.4)	72.8 (23.6)	71.5 (25.0)	0.512
Pain interference with daily activities, mean (SD)	62.0 (18.6)	59.2 (21.3)	61.0 (20.8)	0.290

Type of pain	N (%)	Mean 15D score change
CRPS	45 (4%)	0.016
Headache	43 (4%)	0.03
Musculoskeletal	377 (36%)	0.011
Neuropathic	422 (40%)	0.016
Pelvic	29 (3%)	0.056
Visceral	31 (3%)	0.013
Widespread	84 (8%)	0.027
Missing or not classified	12 (1%)	0.02

Variable	HRQoL after treatment			p*
	Same or worse ( $< 0.015$ )	Minor improvement (0.015 to 0.035)	Major improvement ( $> 0.035$ )	
Total, n	499	96	448	
Total visits, mean (SD)	5.9 (5.0)	5.0 (3.5)	5.8 (4.6)	0.182
Mean duration of treatment contact, weeks (SD)	26.8 (16.4)	23.8 (16.5)	24.5 (16.1)	0.055
Physician visits, mean (SD)	3.4 (2.1)	2.9 (1.7)	3.1 (1.8)	0.008
Psychologist				
Consultation, n (%)	286 (58.2)	51 (54.3)	266 (59.8)	0.604
Multiple ( $\geq 2$ ) visits, n (%)	90 (18.3)	11 (11.7)	84 (18.9)	0.247
Physiotherapist				
Consultation, n (%)	190 (38.7)	27 (28.7)	165 (37.1)	0.186
Multiple ( $\geq 2$ ) visits, n (%)	60 (12.2)	7 (7.4)	60 (13.5)	0.269
Group-based rehabilitation methods, n (%)	54 (11.0)	13 (13.8)	61 (13.7)	0.414
Social worker, n (%)	12 (2.4)	0 (0.0)	8 (1.8)	0.278









